



# **BattleBots™ Inc.**

# **Competition Rules &**

# **Guidelines\***

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New/updated rules are printed in RED

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\*BattleBots Rules & Guidelines are based on the Society of Robotic Combat's General Competition Regulations, Builders Guide and Teleoperated Category Specifications. All competition rules and guidelines subject to change. BattleBots has no affiliation with Robot Wars® or any other robotic sports organization.

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# 1. Introduction

BattleBots celebrates the sport of robotic combat through a contest of battling machines. Entrants design and build “BattleBots” employing a combination of engineering skills, strategy and creativity in this competition for top bot.

This document contains the rules and guidelines necessary for a safe competition. It should be stressed that it is not our intention to limit the creative nature of a BattleBot’s design and construction. Any design that is outside the bounds of what the Competition Rules & Guidelines considers “safe” may be pre-approved by using the request for waiver located in this manual (see section 13). Common sense is stressed in all areas of construction and operation. **Due to safety issue, ALL Super Heavyweights must be pre-approved for competition by BattleBots Inc.** (see section 13).

## 2. BattleBots Competition Format

### 2.1 Match Types

There are two (2) match types that may be entered in BattleBots:

1. Robot Duel – BattleBots compete in a one-on-one tournament within weight classifications. Exact details of tournament procedures (seeding, byes, etc.) will be announced prior to the event. Entrants may enter only one (1) BattleBot per weight-class.
2. Robot Rumble – Free-for-all combat between BattleBots of similar weight-class. Entrants may enter only one (1) BattleBot per weight-class.

### 2.2 Match Time Limits

Robot Duel Competition Time Limits:

Class	Designator	Time Limit
A	Super Heavyweight	3 minutes
B	Heavyweight	3 minutes
C	Middleweight	3 minutes
D	Lightweight	3 minutes

Robot Rumble Competition Time Limits:

Class	Designator	Time Limit
A	Super Heavyweight	5 minutes
B	Heavyweight	5 minutes
C	Middleweight	5 minutes
D	Lightweight	5 minutes

### 2.3 Match Frequency

In **Robot Duel competitions** no BattleBot shall compete in more than one match in any twenty (20) minute period. Therefore, **it is recommended that any routine maintenance take no longer that twenty (20) minutes (especially battery charging and/or replacement)**. Entrants who are not prepared to compete after this period may be forced to forfeit. Time spent in the BattleBot Impound (see 2.6) will not count towards this twenty (20) minutes.

In **Robot Rumble competitions**, contestants may be required to participate in up to two rounds back-to-back.

### 2.4 BattleBox Specifications

The BattleBots Arena or “BattleBox” is a forty eight (48) foot square raised two (2) feet off the ground. The BattleBox will employ a number of hazards and obstacles that could damage and/or disable a BattleBot. Entrants are encouraged to use the hazards and obstacles to their advantage.

### 2.5 Technical/Safety Inspection

To be eligible to compete in BattleBots, entrants must pass a Technical/Safety Inspection. The points covered at the Technical/Safety Inspection shall include:

- Eligibility for class entered – compliance with BattleBots Competition Rules & Guidelines.
- Appearance suitable for competition.
- Leakage – There shall be no visible or audible fluid/gas leaks.
- Confirmation of hydraulic/pneumatic component ratings.
- Adequate sharp edge covers.
- Weight check.
- Projectile tether length, and tether strength.
- Functionality test – A functionality test is used to prove that a BattleBot is capable of reasonably safe control. A simple “driving” test may be setup as part of the Technical/Safety Inspection.

## **2.6 BattleBot Impound**

At the conclusion of any match BattleBots officials may request that a winning BattleBot be placed in impound for inspection. The entrant shall immediately move his/her BattleBot to the impound area, completely render it safe, leave the transmitter, and exit the impound area. If the BattleBot needs to be disassembled BattleBots officials may ask the entrant to remove the parts requested. All work shall be performed in the impound area. Time spent in the impound will not count towards an entrant's guaranteed twenty (20) minutes between matches (see 2.3).

## **2.7 Transmitter Impound**

As a safety measure, all radio transmitters **may** be place in impound during the competition. Transmitters may be released for testing purposes so long as it is cleared with the BattleBots Frequency Coordinator; and transmitters are immediately returned to the impound after testing. Transmitters shall be released from impound no less than seven (7) minutes prior to the start of a match. No one shall turn on his/her transmitter until they are instructed to do so by a BattleBots official.

## **2.8 Power of Officials**

Entrants must follow the verbal instructions of BattleBots officials at all times. This is necessary to maintain the safety of the audience and participants. Circumstances beyond the scope of these rules and guidelines shall be up to judges' decisions. All judges' decisions shall be final.

# **3. Judging of Robot Duel Matches**

## **3.1 Format**

Robot Duel matches will be started with the two BattleBots on opposite ends of the BattleBox. At the start, the BattleBots must be motionless with all rotary weapons spun down. Internal combustion engines may be running at idle. After the official start, BattleBots should exhibit motion on a regular basis so that they are not declared "incapacitated".

Exact details of tournament procedures (seeding, byes, etc.) will be announced prior to the event. Entrants may enter only one (1) BattleBot per weight-class.

## **3.2 Deciding a Winner**

At the conclusion of each match, three (3) official BattleBots' judges shall ascertain the winner using the following criteria in the order they are given.

### **3.2 Deciding a Winner** (continued)

1. If the match was stopped because one participant's BattleBot was incapacitated, the other participant shall be declared the winner. A BattleBot may be considered incapacitated if it cannot show controlled translational motion at the request of an official.
2. If the match was stopped because one participant's BattleBot was violating safety rules, the other participant shall be declared the winner.
3. Judges may allow additional time of up to one (1) minute to determine a winner.
4. If both participants' BattleBots are mobile at the end of the match time, the winner shall be determined by the following point system:
  - Points are awarded based on robot performance
  - There are a total of nine (9) points to be awarded
  - Three (3) judges award three (3) points each (a total of nine (9) points) as follows:
    - One (1) point is awarded to the robot that is more aggressive (as determined by the judges)
    - One (1) point is awarded to the robot that causes more damage to the other robot (as determined by the judges)
    - One (1) point is awarded to the robot that employs and executes a better strategy (as determined by the judges)
  - The BattleBot who is awarded more points shall be determined the winner

### **3.3 Pinning & Lifting**

BattleBots may not win by pinning or lifting their opponents. Judges will allow pinning and/or lifting for a maximum of thirty (30) seconds per pin/lift then ask the attacker to release. Matches will be paused to separate BattleBots in the event that they become stuck together.

## **4. Judging of Robot Rumble Matches**

### **4.1 Format**

Robot Rumble competitions will be started with no more than sixteen (16) BattleBots evenly distributed throughout the arena. At the start, the BattleBots must be motionless with all rotary weapons spun down. Internal combustion engines may be running at idle. After the official start, BattleBots should exhibit motion on a regular basis so that they are not declared "incapacitated". Aggressive BattleBots are more likely to gain the audience support required for winning (if there is not a clear winner).

#### 4.1 Format (continued)

Exact details of tournament procedures (seeding, number of rounds, etc.) will be announced prior to the event. Entrants may enter only one (1) BattleBot per weight-class.

#### 4.2 Deciding a Winner

At the conclusion of each round, the judges shall determine who will advance to the next round using the following criteria in the order they are given.

- If one (1) robot dominated the free-for-all, a winner may be declared even though there is more than one (1) mobile robot remaining.
- If less than fifty percent (50%) of the BattleBots are still mobile at the end of the round and there is no clear winner, all mobile BattleBots shall automatically advance to the next round.
- If more than 50% of the robots are still mobile at the end of the match, the remaining mobile robots shall be ranked based solely on aggression and robot condition. At most, 50% shall advance to the second round. Aggression is judged based on the frequency and severity of contact initiated by the BattleBot.
- Judges may allow additional time of up to two (2) minutes to determine a winner.
- After a maximum of three rounds, a single winner shall be determined based on aggression and robot condition.

### 5. Pit Area

#### 5.1 Pit Crew Members

Each BattleBot shall be allowed a limited number of crew members/attendants based on weight-class as follows:

Class	Designator	# of attendants (including entrant/operator)
A	Super Heavyweight	4 total
B	Heavyweight	4 total
C	Middleweight	3 total
D	Lightweight	2 total

These totals may be modified at the discretion of a BattleBots official.

## **5.2 Pit Passes**

All BattleBot crew members are required to wear official BattleBots Pit Passes at all times during a competition. Crew members must provide a passport size photo for identification purposes to be laminated into the Pit Pass. Pit Passes are non-transferable or exchangeable.

## **5.3 Pit Safety/Behavior**

While it is impossible to list all the safety/behavior requirements of the Pit area, contestants should practice common sense and good sportsmanship at all times. An official Pit Safety Guide addressing specific requirements will be issued at the beginning of the event.

## **5.4 Testing Area**

An area for testing purposes will be provided for all BattleBots entrants. A BattleBots official will supervise the testing area. This official will control entry and exit from the testing area; the testing area schedule; and what the type of testing may be safely executed.

# **6. Required Equipment**

## **6.1 Master Power Switch**

All BattleBots **that are class C or larger** shall have a method of rendering them harmless. The minimum standard shall be an accessible master power switch. This shall disable the drive system and all electric powered weapons. In addition, all internal combustion engines shall return to idle.

A Radio Controlled Master Power Switch shall be required for BattleBots that are unsafe to approach while operating. In most cases this will simply mean taking advantage of the fail-safe features found in most hobby RC sets.

## **6.2 Radio Control System**

In an effort to decrease radio interference, it is recommended that all weight-classes use Pulse Code Modulation (PCM) radio transmitters/receivers. Frequency Modulated (FM) radio systems are permitted but not advisable. All radio systems shall have a robust fail-safe feature that shall prevent a loss of control in the event that RF contact is lost. AM radios are prohibited.



## **7. Structure/Material**

This section deals with materials used to construct a BattleBot’s frame, locomotion systems, weapon systems and electronic/control systems. This subject is covered first because it comprises one of the most important characteristics of a BattleBot—its total mass.

### **7.1 Weight Classes**

BattleBots competition weight classes are as follows:

Class	Designator	Range (Wheeled)	Range (Non-Wheeled)
A	Super Heavyweight	211 – 325 lbs.	316 – 488 lbs.
B	Heavyweight	116 – 210 lbs.	174 – 315 lbs.
C	Middleweight	059 – 115 lbs.	088 – 173 lbs.
D	Lightweight	025 – 058 lbs.	025 – 087 lbs.

These ranges are **strictly** enforced. **You can expect for your BattleBot to be weighed at the pre-event weigh-in and immediately preceding and/or following a match.** All BattleBots shall be weighed “wet” — that is weight **will include** any fluids such as CO<sub>2</sub>, gasoline or hydraulic fluid. BattleBots that employ a modular design shall be weighed in all configurations. Cosmetic features and any accessory systems such as cameras, Internet feeds, telemetry, etc. is included in a BattleBot’s weight.

**Note:** Most typical bathroom scales are 3-5% low.

### **7.2 Excluded Weight**

Any remote camera and/or audio system installed at the event by the media (radio/television crew, video capture crew, etc.) shall be excluded from the total weight of a BattleBot. Entrants are responsible for clearing these systems with BattleBots officials.

### **7.3 Materials**

There is no restriction on the number of different types of materials that can be used to construct your BattleBot. The only types of materials that are not allowed are those that by their nature are dangerous to handlers or builders (asbestos, for example). It is impossible to list all such materials, so it is up to the individual builders to use care when selecting and using potentially dangerous materials.

## **8. Locomotion**

There is only one restriction on the type of locomotion that may be used to move a BattleBot. A BattleBot may not be moved using powered flight. Moveable aerodynamic devices may be used for cooling and control, but shall be forbidden to provide lift in the absence of ground effects.

### **8.1 Non-Wheeled Entrants (StompBots)**

A BattleBot is considered to be “wheeled” if there nominally is a direct, continuous, linear relationship between a rotary actuator and the BattleBot’s translational displacement. **The definition of a "walking" robot (StompBot) is less clear. Those robots satisfying one or more of the following requirements will always be considered "StompBots".**

- 1. Any robot that uses linear actuators exclusively without any wheels.**
- 2. Any robot that uses a combination of linear actuators and rotary actuators that are driven in an oscillatory manner (not continuous).**

**Rotary actuator driven walkers that rely on "cams" for walking motion should be approved in advance by BattleBots Inc.** You may use a rotary actuator to drive a StompBot provided the motion is not continuous. This prevents a builder from calling spokes that protrude through a wheel “legs”. You may have undriven wheel type support devices (such as ball casters) on non-wheeled BattleBots provided that they do not support more than 50% of the weight of the BattleBot at any time.

### **8.2 Non-Wheeled Weight Considerations**

Non-Wheeled BattleBots shall be given an extra weight allowance as follows:

Class	Designator	Range (Wheeled)	Range (Non-Wheeled)
A	Super Heavyweight	211 – 325 lbs.	316 – 488 lbs.
B	Heavyweight	116 – 210 lbs.	174 – 315 lbs.
C	Middleweight	059 – 115 lbs.	088 – 173 lbs.
D	Lightweight	025 – 058 lbs.	025 – 087 lbs.

### **8.3 MultiBots**

A MultiBot is a BattleBot that breaks up into multi-controlled segments. MultiBots are permitted so long as they begin each match in “single state” and can exhibit the ability to return to “single state.” MultiBots lose when 50% or more of its segments are immobilized. All MultiBots segments shall be either wheeled or non-wheeled. Combination wheeled/non-wheeled MultiBots are not permitted.

## **9. Power Sources**

A good measure of the potential danger of a BattleBot (to other BattleBots, its builders and spectators) is the amount of potential energy stored in its power sources. These power sources ultimately provide the capability to move and compete with other BattleBots

### **9.1 Batteries**

Since many BattleBots get flipped upside down during competitions, it should be safe to use your batteries in any position. Therefore, permitted batteries shall have a construction that utilizes immobilized electrolytes only. Common types of these batteries are nickel-cadmium and sealed lead acid gel cells.

**Note:** There is no limitation on maximum voltage, however entrants should use extreme care when operating high voltage systems.

### **9.2 Compressed Gas**

Energy can be stored in a container of compressed gas. This gas can then be used to power pneumatic cylinders or similar devices. There is no restriction on the volume of compressed gas that may be stored; however there is a limitation on the maximum pressure that may be used. Any system involving the use of pressurized gas shall be limited to 2500 psi. All compressed gas bottles shall be filament wound composite bottles currently certified for the pressure used. If a filament wound bottle is not used, or liquefied gasses are used the maximum operating pressure shall be limited to 1000 psi.

### **9.3 Liquid Fuels**

A much higher energy density can be achieved by using liquid fuels such as alcohol or gasoline. For this reason, the use of such fuels is subject to more safety constraints than the power sources previously described. The permitted fuels are any grade of unleaded gasoline, diesel, alcohol, or commercial fuel used in “remote control” 2-stroke engines. All fuel lines shall be protected by metallic braid, and all ends shall be clamped. Fuel tanks must be impact resistant.

#### **9.3.1 Liquid Fuel Restrictions**

Fuel Limits based on class and drive type. A direct drive system converts the rotary motion of the engine directly into locomotion or weapons system motion. An indirect drive system first converts the rotary motion into another form of energy and then uses the alternate form of energy to power the locomotion or weapons. An example of indirect drive is using an IC engine to power a hydraulic pump or electrical generator. Using an IC engine to drive and store energy in a flywheel is NOT considered indirect drive. This is because there is no energy conversion.

### 9.3.1 Liquid Fuel Restrictions (continued)

Class	Designator	Direct Drive Fuel Limits	Indirect Drive Fuel Limits
A	Super Heavyweight	14 ounces	21 ounces
B	Heavyweight	10 ounces	15 ounces
C	Middleweight	10 ounces	15 ounces
D	Lightweight	8 ounces	12 ounces

## 10. Drive Types

This category deals with mechanical drives for either vehicle locomotion or weapons. These drives include both linear and rotary devices.

### 10.1 Electric

There is no restriction on the size or power of the electric motors that can be used. Although electric motors are very safe in general, care should be taken due to the very high temperatures generated when the motors are “abused” during competition. It is a good idea to place large capacitors across the terminals of electric motors to prevent voltage spikes from interfering with the control electronics.

### 10.2 Hydraulic

Like pneumatic systems, the total volume of hydraulic fluid is not restricted, however, the maximum operating pressure is. Any system involving the use of pressurized liquid shall be limited to 5000 psi. If an accumulator or other volume building device is employed the maximum pressure shall be 1200 psi. All components shall be marked and certified for the pressure employed.

### 10.3 Pneumatic

Pneumatic rotary drives are subject to the same restrictions as pneumatic power sources. Any system involving the use of pressurized gas shall be limited to 2500 psi. All compressed gas bottles shall be filament wound composite bottles currently certified for the pressure used. If a filament wound bottle is not used, or liquefied gasses are used the maximum operating pressure shall be limited to 1000 psi.

### 10.4 Internal Combustion

There is no expressed limit on the maximum horsepower rating of an internal combustion motor. The biggest concern with gasoline engines is the ability of the builders to shut them off in the case of emergency. All internal combustion engines shall have a throttle return spring that shall return the engine to idle when power to the control actuator is lost. All Internal Combustion Engines shall have a centrifugal clutch installed at the engine. The clutch shall not allow rotation of the attached drive train while the engine is at idle.

## **11. Weapon Types**

### **11.1 Sharp Edges**

All sharp edges shall be covered with soft protective coverings. These coverings shall not be removed until the BattleBot is inside the arena, or for service directly involving the sharp edge.

### **11.2 Forbidden Weapons**

The following weapons may not be used:

- **Electricity** - The use of electricity as a weapon shall be forbidden. This includes, but is not limited to the following:
  - Stun Guns/Cattle Prods
  - RF jamming equipment, etc.
  
- **Liquids** - The use of any liquid as a weapon shall be forbidden. This includes, but is not limited to the following:
  - Water and other liquids
  - Liquefied gasses
  - Foams, Adhesives, etc.
  
- **Explosives or Flammable Solids** - This includes, but is not limited to the following:
  - DOT Class C devices
  - Gunpowder/Cartridge Primers
  - Military Explosives, etc.
  
- **Lights** - Lights that are bright enough to obstruct an Official, Entrant, or Judge's vision shall be forbidden. This includes, but is not limited to the following:
  - Lasers over 5mW output.
  - Any Strobe Light
  - Flood type lights
  
- **Visual Obstruction** - Any attempt to impair the vision of another Entrant shall be forbidden. This includes, but is not limited to the following:
  - Visible smoke
  - Lights/lasers directed at the Entrants, etc.
  
- **Projectiles** - Untethered projectiles are forbidden. Tethered projectiles are allowed. Tethered projectiles can carry a tremendous amount of energy, the restraints must be strong enough to absorb this energy without sustaining any damage. The length of the tether as measured from the body of the BattleBot to the tip of the projectile must be less than 10 feet. Entrant may be disqualified for intentionally using a tether as an entanglement device (see #8).

## **11.2 Forbidden Weapons** (continued)

- **Heat** - Heat specifically generated to damage an opponent is forbidden.
  
- **Entanglement Devices** - Any device specifically designed to entangle another BattleBot shall be forbidden. This includes, but is not limited to the following:
  - Any type of net.
  - Fishing Line, String, etc.
  - Tape

## **12. Miscellaneous**

### **12.1 Advertising and Graphics**

Advertising and graphics (names, symbols, logos, and other objects) may be displayed on BattleBots provided that they are in good taste and do not interfere with identification marks or safety switches.

This rule is necessarily subjective due to the potential large number of minors in the viewing audience.

### **13. Request for Waiver (required for Super Heavyweights)**

Builder Name: \_\_\_\_\_

Builder Address: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

BattleBot Name: \_\_\_\_\_

Describe BattleBot feature(s) - enclose pictures where possible:

Describe any added safety features associated with the above feature(s) that may make it safer to the participants/audience:

Send to:  
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